PROPOSALS BY CANADA
FOR THE ITU WORLD ADMINISTRATIVE RADIO CONFERENCE
FOR THE PLANNING OF THE HIGH FREQUENCY BANDS ALLOCATED
TO THE BROADCASTING SERVICE

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PRINCIPAL FEATURES OF THE CANADIAN PROPOSALS

General

The proposals are in two parts. The first part deals with the specification of an item by item proposed response to the topics to be discussed during both sessions of the Conference. The second part concerns specific procedural proposals for the second session, which are intended to satisfy the following objectives:

1. To establish procedures which embody the principles of flexibility and equity in assigning frequencies in the HF broadcasting service;

2. To present a revised Article 17 procedure which places emphasis in the Radio Regulations on how to put systems into operation (notification procedures) based on the concept of broadcast requirements;

3. To specify in an amended Section of Article 17 a method of how administrations can effect changes to their requirements (modification procedures).

Planning Considerations:

According to Resolution 508 of the Radio Regulations the existing situation in the HF bands allocated exclusively to the broadcasting service is not satisfactory. Furthermore, it is noted in this Resolution that it is important to ensure that all countries are guaranteed free and equal rights to the use of these bands. In order to ameliorate this situation and meet the objectives embodied in Resolution 508, means must be found by the Conference to ensure that the HF broadcasting bands are used in an efficient manner so as to satisfy world-wide requirements to the extent possible.

One of the most important activities of the Conference, therefore, will be for administrations to reach consensus on an appropriate planning method which can lead to the equitable distribution of HF frequencies to accommodate their respective broadcast requirements. The use of the existing HF broadcasting allocations is governed by the provisions of Article 17 of the Radio Regulations which provide for "seasonal" schedules to be made up four times a year to account for varying radio propagation conditions. Under the proposed new approach, while seasonal broadcasting schedules would continue to be produced, there would be a consolidated broadcast requirement plan consisting of a Master List of current operational and projected requirements, which can be easily modified on a seasonal basis. Such a broadcast requirement plan could be of indefinite duration, depending upon band capacities, technical limits and administrative procedures agreed to by the Conference.

It is a fundamental feature of this approach that the necessary flexibility be introduced in the Radio Regulations to accommodate changes in broadcast requirements. By means of a workable amending formula - specified in a revised Section III of Article 17 - an administration could submit modifications to its requirements without resorting to excessive frequency usage in order to ensure protection for its shortwave service. In addition, a well-defined procedure based on monitoring information would be utilized in order to ensure that unused assignments could be deleted from a particular seasonal plan to maximize efficient spectrum usage. While such a planning method can be of great use in improving frequency utilization and in facilitating a co-operative approach to the subject, it remains incumbent upon all administrations to exercise responsibility and restraint in working toward a successful Conference and in eliminating the problems which have compromised the efficient use of the bands in the past.

Planning Implementation: A Computer-aided System

A computer-based system is being developed for the purpose of establishing a methodology to implement the proposed planning approach. This system, in utilizing the concept of administrations submitting broadcast requirements, the essential elements of which are the period of broadcast, the area to be served, and the transmitter location, is capable of producing seasonal broadcasting schedules in which all requirements have received equitable treatment in the application of the agreed technical standards. Moreover, the system, while attempting to provide continuity of channel assignment from hour to hour and season to season, is designed to incorporate changes efficiently into the requirements list and into the signal strength data base so that revised schedules may be available quickly.

While the system is capable of improving spectrum utilization through a systematic method of frequency assignment, its structure is dynamic and flexible in the sense that modifications to its elements and features may be made as its design becomes more refined and sophisticated. Canada therefore invites the cooperation and participation of all administrations in striving toward the development of a workable model of a computer-aided planning system for the second session of the Conference.

A more complete description of the operation of a computer system is contained in agenda item 4.2.3 of these proposals (Approaches to Implementation).

Canadian Broadcast Requirements: An Overview

Canada's principal interest in contributing towards a successful planning conference lies in the firm conviction that any further deterioration in the HF broadcasting environment would place its own international broadcaster, Radio Canada International (RCI), and indeed, the broadcasters of many other administrations, in an extremely difficult position in terms of maintaining a satisfactory level of service. In order to even preserve RCI's current broadcasting schedule which includes some 160 hours per week in eleven languages to five regions of the world, costly measures undoubtedly will have to be taken to compensate for such practices as the excessive use of power, redundant use of frequencies, intentional interference ("jamming") and out-of-band transmissions. In the face of congestion and a steadily mounting interference problem, these practices could cause serious problems for many administrations using shortwave as a medium to satisfy international and domestic broadcasting requirements.

It is Canada's belief, therefore, that planning the bands on the basis of broadcast requirements represents the only feasible and realistic means of ensuring that some direction and order are brought to bear on the use of shortwave broadcast frequencies and that the unnecessary waste of limited spectrum is avoided.

PART I

CANADIAN INPUT TO CONFERENCE AGENDA

The Canadian input to the Conference will follow serially the items specified in the agenda contained in the Administrative Council Draft Resolution as outlined in the Annex to the ITU Circular Letter No. 491 which describes the program for both sessions of the HF Broadcasting Conference.

Agenda Item 4.1.1 Definitions

Technical Terms Relating to High Frequency Broadcasting

Proposal

It is proposed that the following definitions (some of which arise from CCIR texts) should not be included in Article 1 of the Radio Regulations but should be contained in any plan developed for shortwave broadcasting at the Conference.

1. Mode Reliability: Probability that a specified value of signal-to-noise ratio is achieved or exceeded by a specified mode, at a single frequency, for a single circuit.

2. Circuit Reliability: Probability that a specified value of signal-to-noise ratio is achieved or exceeded by combining all modes, at a single frequency, for a single circuit.

3. Circuit Reliability (versus noise and interference): Probability that a specified value of signal-to-noise and interference ratio is achieved or exceeded by combining all modes, at a single frequency, for a single circuit.

4. Service Reliability: Probability that a specified value of signal-to-noise ratio is achieved or exceeded by combining frequencies, for a specified service.

5. Service Reliability (versus noise and interference): Probability that a specified value of signal-to- (noise and interference) ratio is achieved or exceeded by combining frequencies, for a specified service.

6. Minimum Usable Field-strength (E_{min}): Minimum value of the field strength necessary to permit a desired quality, under specified receiving conditions, in the presence of natural and man-made noise, but in the absence of interference from other transmitters.

7. Usable Field-strength (E_u): Minimum value of the field strength necessary to permit a desired reception quality, under specified receiving conditions, in the presence of noise and interference, either in an existing situation or as determined by agreements or frequency plans.

8. Reference Usable Field-strength (E_{ref}): The agreed value of the usable field strength that can serve as a reference or basis for frequency planning.

9. Audio-Frequency (AF) Signal-to-Interference Ratio: The ratio (expressed in dB) between the values of the voltage of the wanted signal and the voltage of the interference, measured under specified conditions, at the audio-frequency output of the receiver.

This ratio corresponds closely to the difference in volume of sound (expressed in dB) between the wanted program and the interference.

10. Audio-Frequency (AF) Protection Ratio: The agreed minimum value of the audio-frequency signal-to- interference ratio considered necessary to achieve a subjectively defined reception quality.

This ratio may have different values according to the type of service desired.

11. Radio-Frequency (RF) Wanted-to-Interfering Signal Ratio: The ratio (expressed in dB) between the values of the radio-frequency voltage of the wanted signal and the voltage of the interfering signal, measured under specified conditions, at the radio-frequency input of the receiver.

For example, in the case of amplitude-modulation wanted and interfering transmissions (carrier with double sideband), the chosen values will be the effective radio-frequency voltages that correspond to the wanted and interfering carriers.

12. Radio-Frequency (RF) Protection Ratio: The value of the radio-frequency wanted-to interfering signal ratio that enables, under specified conditions, the audio-frequency protection ratio to be obtained at the output of a receiver.

13. Required Service Area (in HF broadcasting): The area within which an administration requires a service of technically satisfactory quality.

14. Coverage Area: The area associated with a station for a given service and a specified frequency within which, under specified technical conditions, radiocommunications may be established with one or several other stations either for reception or transmission or both.

15. Service Area: The area associated with a station for a given service and a specified frequency under specified technical conditions where radiocommunications may be established with existing or projected stations and within which the protection afforded by a frequency assignment or allotment plan or by any other agreement must be respected.

16. Reception Zone: A geographically defined area for High Frequency broadcasting purposes (see ITU Radio Regulations, Annex to Appendix 1, page AP1-33).

17. Reception Points: Geographically defined locations within a reception zone for High Frequency broadcasting purposes.

18. Broadcast Requirement: A requirement to provide a broadcasting service during a specified period to a specified reception area from a particular transmitter station.

Agenda Item 4.1.2 Methods for the Prediction of Field Strength; Optimum Frequencies; Atmospheric and Man-made Radio Noise Data; Other Factors Concerning HF Propagation which are Relevant to the Planning of Broadcasting Services

Prediction of Field Strength

Through IWP 6/12 the CCIR has studied many prediction methods applicable to the needs of the HF Broadcasting Conference. Report 894 recommends a method which is an amended form of that in Report 252-2, merged with that of the FTZ for the longer distances.

Optimum Frequencies

Report 894 also reflects the view that a prediction method should include the computation of service reliability as a basis for choosing the optimum frequency bands to provide a broadcast service. Report 892 outlines several acceptable methods to compute reliability, and Report 729-1 refers to the need to improve the calculation of circuit reliability.

Atmospheric Noise Data

The revised text of CCIR Report 322-2 clarifies the use of the noise data contained in the report. These data have formed a satisfactory basis for noise prediction for many years. A CCIR computer program is available which gives a numerical representation of world maps of atmospheric noise in either local or co-ordinated universal time. A simplified form of the data has been used by the IFRB in its Technical Standards, Series A.

Man-made Noise Data

CCIR Reports 258-4 and 670 outline categories of man-made noise based on the human environment. Recommendation 339 also provides useful information.

Proposal

The computer system to be used at the Conference for planning, and later by the International Frequency Registration Board (IFRB) for seasonal frequency assignment schedules, should incorporate the Report 894 method for HF propagation prediction.

The system should also use service reliability as the criterion for choosing the frequency bands to satisfy a broadcast requirement.

The information on radio noise in the IFRB Technical Standards should be verified, since it forms, with the predicted field strength, the basis for the computation of service reliability.

The effect of man-made radio noise and interference should be taken into account by increasing the minimum usable field strength by 3 dB as specified in the proposal relative to agenda item 4.1.7.

Agenda Item 4.1.3 Values of the Appropriate Solar Index and the Seasonal Periods based on which Planning should be Carried Out

The CCIR Recommendation 371-3 entitled 'Choice of Indices for Long-Term Ionospheric Predictions' describes several available indices. Predictions are made regularly by the CCIR and published with measured data in the monthly circulars as well as in the Telecommunication Journal. Many administrations also provide predictions.

The commonly used index is the twelve-month running mean, R_{12}. The new CCIR Report 894 notes that five suitable fixed values of R_{12} are sufficient to give the optimum broadcast band, or one band lower.

Proposal

For planning purposes at the First Session of the Conference, it may be necessary to choose fixed values of R_{12} which best represent a range of solar cycle conditions. Subsequently, the Conference should use the best available predicted value of R_{12} in preparing the Tentative Schedule for a given season.

For planning purposes, the present division of the year into seasonal propagation periods should be maintained.

Agenda Item 4.1.4 DSB System Specifications, Transmission Characteristics, Including Modulation and Audio Processing Standards

Proposal

It is recommended that the following characteristics and values be required and adopted for use:

a) Channel Spacing - Studies have indicated that the optimum channel spacing is 9 or 10 kHz. Because a channel spacing of 10 kHz will facilitate the later introduction of SSB transmissions and because it may also make it possible to implement the concept of interleaving transmissions at 5 kHz intervals in such a way that the frequency difference of the transmissions serving the same area is at least 10 kHz, the adoption of 10 kHz separation is favoured.

b) Carrier Frequencies - These should be integral multiples of the carrier spacing adopted.

c) Frequency Tolerances - The provisions of Appendix 7 of the Radio Regulations, 1982 state that frequency tolerance should be kept within 15 parts per million up to 1990 and 10 Hz thereafter. In order to avoid degradation similar to periodic fading caused by frequency differences of a few hertz, administrations should be encouraged to operate with a frequency tolerance of 0.1 Hz, a tolerance which would also be suitable for SSB emissions.

d) Necessary Bandwidth of Emission - In amplitude modulated DSB systems, this is twice the audio-frequency bandwidth.

e) Audio-frequency Bandwidth - This bandwidth should not exceed 4.5 kHz.

f) Out-of-band Emissions - For A3E type of emissions, i.e., radio broadcasting emissions using amplitude modulation of the carrier and emitting both sidebands, the out-of-band spectrum must be controlled. In addition to the limits specified in Appendix 8 of the Radio Regulations (i.e., 50 mW or 60 dB), it is recommended that these emissions relating specifically to 4.5 kHz audio-frequency bandwidth be contained within the limits which can be deduced from the appropriate CCIR texts, Rec. 328-4 and Report 324-2.

g) Characteristics of Modulation Processing - Compression of the audio-frequency signal at the audio output is recommended, but it should permit a dynamic range of not less than 20 dB.

h) Maximum Depth of Modulation - In order to avoid over-modulation and to take account of non-linearities that exist in transmitters, the modulation index should be kept slightly less than 1.

i) Overall Bandwidth of the Receiver - It is proposed that the characteristics of the reference receiver mentioned in CCIR Recommendation 560-1 be used for planning purposes. Recent measurements made on medium-priced DSB receivers in different parts of the world confirm that the characteristics of the EBU reference receiver continue to represent a mean value of currently available receivers.

Agenda Item 4.1.5 Receiver Characteristics

CCIR Recommendation 560-1 and Report 794-1 are based on the latest information on receiver characteristics.

Proposal

It is proposed that the characteristics of the reference receiver mentioned in CCIR Recommendation 560-1 be used for planning purposes. Single sideband receiver characteristics are still under study with the result that no definite proposal can be made at this time. However, the SSB emission specifications proposed under agenda item 4.1.12 permit DSB receivers to adequately receive SSB emissions.

Agenda Item 4.1.6 Radio Frequency Protection Ratios and Channel Spacing

Proposal

Since there exists a direct relationship among the RF co-channel protection ratio, channel spacing and band capacity, it is necessary to weigh the relative importance of achieving a high grade of service against attaining a successful broadcast plan. It is proposed, therefore, that the recommended values specified below for co-channel protection ratio and channel spacing be adopted.

Based on the results of both subjective and objective analyses, it is recommended that a value of 27 dB for stable conditions be used as the basis for planning. In cases where the number of requirements is such, in a particular geographical area, within any particular band and during a particular time period, that 27 dB protection is unattainable, it is proposed that the minimum value of 17 dB be used for stable conditions. If this minimum value is compromised, then planning the use of the bands would become increasingly more difficult.

In the presence of fading, it is proposed that the values given in the table which forms the basis of CCIR Recommendation 411-2 be utilized.

As far as channel spacing is concerned, it is recommended that 10 kHz be the separation between adjacent transmissions as received in any geographical location. In arriving at this decision the curves specified in CCIR Report 457-2 were used. Appropriate RF protection ratios for SSB and for the transition from DSB to SSB remain under study.

Agenda Item 4.1.7 Minimum Usable and Nominal Values of Field Strengths Required for Satisfactory Service

Proposal

The terms minimum usable field strength and reference usable field strength as defined in CCIR Recommendation 499-2 are appropriate for use in HF broadcasting planning (see definitions 6 and 8 in item 4.1.1).

The view that the minimum usable field strength should be determined by taking into account the diurnal, seasonal and geographical distribution of noise is supported. A simplified presentation of the data on the pattern followed by the IFRB Technical Standards is recommended.

In a well planned utilization of the available spectrum, the principle of sharing the use of frequencies among several HF broadcasts should be pursued. Under such circumstances any coverage area would be limited by the effects of both noise and interference. A balanced situation is reached where the influence of noise and interference is approximately equal. In this case, the reference usable field strength will be 3 dB higher than the minimum usable field strength. Consequently,

$$E_{ref} = E_{min} + 3 \text{ db}$$

is the recommended reference usable field strength.

Agenda Item 4.1.8 Transmitter Power, Antenna Characteristics and Effective Radiated Power Appropriate for Satisfactory Service Taking into Consideration the Above Technical Factors

In HF broadcasting, coverage is determined principally by the characteristics of the antenna used and the transmitter power.

In designing an HF broadcasting service the choice of the optimum antenna is of primary importance. The use of directional antennas, where appropriate, would minimize interference and facilitate the achievement of the desired value of reference usable field strength in the required service area.

Proposal

Using an agreed set of standard antennas representing the majority of the antennas used in practice and having selected the most appropriate antenna, it would then be necessary to determine the transmitter power required to achieve the reference usable field strength at a defined set of test points in the required service area for a given reliability of service. The use of transmitter power in excess of the value necessary to provide the reference usable field strength should be avoided.

It is suggested that consideration be given to the possibility of establishing an upper limit for transmitter power of 250 kW.

Agenda Item 4.1.9 Maximum Number of Frequencies Required for Broadcasting of the Same Program to the Same Zone

Shortwave propagation conditions deviate randomly from the monthly median, and thus the frequency of optimum reception will change from day to day and during the day. Unlike the fixed service, no immediate feedback from the receiving site is possible, and therefore the broadcaster may need to provide a complement of frequencies in different bands to reach a high degree of reliability.

Proposal

From a technical point of view, the number of frequencies required should be established for each hour in order to provide a service reliability of at least 90 per cent of the time to at least 90 per cent of the test points within the required service area.

For planning purposes, it may be necessary to place a limit on the number of frequencies, particularly in the case where the use of additional spectrum does not increase the service reliability for a specific percentage number of test points in the required service area. In any case, under normal circumstances not more than one assigned frequency should be used in each frequency band for broadcasting the same program to the same service area.

Agenda Item 4.1.10 Use of Synchronized Transmitters

In certain cases where the service area is extensive, the utilization of only one frequency could lead to the use of antennas with low directivity, thereby losing the main advantages of directional antennas. If the advantage of directional antennas is to be retained, the same program can be successfully transmitted in several different directions by using synchronizing techniques; see, for example, CCIR Recommendation 205-2.

Proposal

It is suggested that the use of synchronized transmissions can help achieve the specified service reliability at the largest number of test points, spread over an extended service area. This would be an effective means of achieving spectral efficiency.

Agenda Item 4.1.11 Determination of Reception Zone

Proposal

The reception zones shown in Appendix I of the Radio Regulations have proven to be appropriate for describing the area within which an administration requires a service of technically satisfactory quality. In the case where this area is smaller than a given reception zone, the practice of subdividing the reception zones geographically by using such terms as north, south, east and west, although not defined precisely, appears to offer certain advantages.

Annex 5 of these proposals defines specific geographic points for all reception zones. These reception points should be added to the geographical zones for HF broadcasting in Appendix 1 of the Radio Regulations.

Agenda Item 4.1.12 SSB System Specifications

Proposal

It is recommended that the following specifications be adopted for use:

a) Channel Spacing - In order to facilitate the transition from DSB to SSB systems, the channel spacing to be adopted for SSB should be half the channel spacing chosen for DSB.

b) Carrier Frequencies - These should be integral multiples of the carrier separation adopted.

c) Frequency Tolerances - See item 4.1.4 c)

d) Necessary Bandwidth of Emission - In amplitude-modulated SSB systems, this is equal to the audio-frequency bandwidth.

e) Sidebands - It is proposed that the upper sideband be used. The suppression of the lower sideband with respect to the wanted sideband should be at least 35 dB. Investigation of the influence of the degree of suppression of the unwanted sideband on the relative RF protection ratio leads to this conclusion.

f) Degree of Carrier Reduction - This reduction is relative to peak envelope power. In order to facilitate the introduction of SSB transmission, a value of 6 dB may be used initially. As a final objective, a carrier reduction of 12 dB is considered to be a suitable value with respect to receiver design and cost.

g) Characteristics of Modulation Processing - These are essentially the same as adopted for the DSB emissions, i.e., that compression of the audio-frequency signals should allow a dynamic range of not less than 20 dB.

h) Audio-frequency Bandwidth - A bandwidth of 4.5 kHz should not be exceeded.

i) Overall Bandwidth of the Receiver - The desirable features for SSB receivers are still under study. The SSB specifications are expected to permit compatible reception of SSB emissions by DSB receivers.

Agenda Item 4.2.1 Planning Principles

Proposal

As a means of establishing a frame of reference within which the proposed planning method would operate, the Canadian approach contains the following features:

1. the guarantee of equitable access to the frequency bands allocated to the HF broadcasting service shall be achieved by treating all broadcast requirements in the same manner prior to the beginning of each broadcasting season;

2. the recognition of the need for realistic forecasts of broadcast requirements to be used as the basis for assignments;

3. the establishment of assignments which can be utilized to accommodate both national and international requirements;

4. the acknowledgement of the need to accommodate unforeseen new program services or an increase or decrease in broadcast requirements;

5. the assurance of equitable treatment of all requirements and the minimization of dislocation of existing operational networks during the implementation and operation of the planning procedure;

6. the establishment of technical parameters and interference criteria which can accommodate changing technology and service requirements;

7. the development of provisions for modifying technical parameters and interference criteria to take advantage of technical developments that are more efficient and/or less costly;

8. the assurance that the planning procedure makes efficient use of the spectrum resource and that there is incentive to use optimum technical standards;

9. the recognition that, should greater than desirable loading of the bands or lowering of protection levels be necessary to accommodate the minimum broadcast requirements of all administrations, then all will share these service limitations equally.

10. the recognition of the desirability and need to implement continuity of frequency usage to fulfill the same requirement, provided that such frequency continuity does not compromise optimum band sharing arrangements.

Agenda Item 4.2.2 Methods of Planning

Because for several decades accommodation of the divergent, complex and often conflicting requirements of high frequency broadcasting has been an ongoing international problem, coherent planning of the spectrum allocated to the HF broadcasting service has been extremely difficult. Nevertheless, the 1979 World Administrative Radio Conference, in resolving to convene a future conference for planning the HF broadcast bands, clearly recognized that a responsive planning system was needed to ensure that all countries are afforded equitable rights to the use of the bands. Accordingly, the approach to HF broadcast planning presented by Canada is an effort to provide a basis for facilitating the development of a new spirit of co-operation among administrations in the planning of the service.

Proposal

The planning approach directs attention to the prime concern of HF broadcasters - the delivery of program services. In the process it shifts the focus from "frequency requirements" to the details of administrations' current operational and projected "broadcast requirements", each properly notified operational requirement receiving a frequency assignment for the appropriate broadcasting season. The composite of current operational and projected requirements, i.e., the Master List, constitutes a prime element of the broadcast requirement plan.

It is an essential feature of this approach that tentative broadcasting schedules containing the specific frequency assignments be generated seasonally by the International Frequency Registration Board (IFRB) in accordance with the frequency assignment process to be approved at the Conference; the tentative broadcasting schedules would comprise only the operational requirements currently in use which are contained in the Master List. Upon publication of the tentative schedules and upon the establishment of suitable coordination procedures between the Board and administrations, a final seasonal broadcasting schedule would be produced.

For the planning method to operate satisfactorily, it would be necessary to establish at the Conference, procedures for the accommodation of unforeseen modifications to requirements, for the inclusion of new requirements in the Master List, and for the removal of requirements no longer being utilized. In addition, in instances where the presence of harmful interference compromises the integrity of an administration's programming service, provision would be made for that administration to request that, as determined at the Conference, alternate arrangements be made including the possibility of changing frequency, to compensate for the loss in service. The procedure would, furthermore, operate dynamically with the Master List being updated seasonally prior to the preparation of the broadcasting schedule to reflect changes in the broadcast requirements of administrations.

It would be a further task of Conference participants at the First Session to reach consensus on the elements of a computer-aided planning system (see item 4.2.3 of these proposals) as a means of ensuring the equitable accommodation of the programming requirements of all administrations contained in the Broadcast Requirement Plan. The Conference would reach agreement on the appropriate planning process and the Board would apply this procedure in obtaining satisfactory frequencies for all of these requirements to be used as the basis for the tentative broadcasting schedules. The planning system is predicated on the concept of using one seasonal frequency assignment in a broadcasting band, for a given requirement, under normal conditions. The number of bands needed is based on the predicted reliability of service.

For the convenience of shortwave listeners, under this procedure, where the agreed technical criteria can be met, and where the development of optimum band sharing arrangements is not compromised, the same frequency would be assigned to an administration in successive seasonal schedules.

A principal objective of this approach is that, in applying the planning process leading toward the production of seasonal tentative broadcasting schedules, every effort would be made to satisfy all notified requirements. However, in a particularly congested area, where requirements exceed the capacity of the available frequency band, the administrations affected, in consultation with the IFRB, may agree to take some of the following steps in order to accommodate all of the requirements:

a) Reduce the co-channel and/or adjacent channel protection ratios;

b) Adjust certain technical parameters such as the transmitter power relating to a particular assignment in order to improve compatibility;

c) Pursue any other course of action such as the adjustment of broadcasting schedules in order to reduce the interference potential.

In pursuing such steps, it is envisioned that the Board would assist administrations in specifying the most appropriate courses of action available to resolve the incompatibilities. This would expedite the planning process by limiting the number of occasions it would be necessary for an administration to attempt to reach a satisfactory solution to an incompatibility problem. In addition, if upon the publication of the tentative schedule an administration, after coordination, considers the recommendations contained therein to be unacceptable, it may be necessary for that administration, in consultation with the Board and other affected administrations, to adjust its requirements in such a way as to produce a satisfactory result.

By such means, it will be possible to ensure that all countries are guaranteed equitable rights to the use of these bands as noted in Resolution 508.

Another feature of this approach is that in order to deal with frequency assignments that are contained in the seasonal schedules but not put into operation, an appropriate procedure would be implemented which is based on monitoring information. According to this procedure, in any particular season where a frequency assignment was found to be non-operational, after consultation between the administration in question and the Board, the broadcast requirement to that particular frequency assignment would revert in the Master List to the "projected" category until such time that the requirement was re-activated by the administration.

In brief, it is believed that acceptance of this flexible and dynamic approach to HF broadcast planning would facilitate the creation of a constructive framework for the effective long-term equitable use of the HF broadcasting bands by all administrations.

Agenda Item 4.2.3 Approaches to Implementation

Proposal

A method appropriate for the planning of the bands allocated to the HF broadcasting service is proposed in Item 4.2.2. This method requires five essential elements for its implementation. Each of these elements should be programmed on a computer because of the large amount of data to be processed and number of calculations to be performed. Each should be developed separately so that it can be run independently for maximum flexibility in modifying and developing a planning system. These elements can provide the bases for further development of a computer-aided planning system as specified by the first session of the Conference.

The proposed elements are conceived based on a planning system having the following characteristics:

a) The basic concept is that of a broadcast requirement, defined as a need to provide a broadcasting service during a specified period to a specified reception area from a particular transmitter station.

b) For each requirement, administrations are requested to supply information on the power of the transmitter, available antennas and other operating characteristics needed to provide the specified broadcasting service.

c) All requirements relevant to a particular broadcasting season are treated in the same manner when applying the agreed technical criteria.

d) To provide guidance to administrations, data from the computer will be provided on the predicted service using the characteristics of the equipment as requested in (b) above. In addition recommendations on the optimum equipment configurations will be provided if necessary including the most appropriate antenna from a group of standard broadcast antennas.

e) For each season, a broadcasting schedule is produced similar to the IFRB's present "Tentative High Frequency Broadcasting Schedule". In cases where certain minimum technical objectives such as the reference usable field strength and radio frequency protection ratio used in the planning process cannot be achieved, the administrations concerned will be advised by the Board in good time together with any suggestions it may be able to offer under the circumstances. Broadcasting requirements in which all technical criteria are not satisfied will be highlighted in the schedule print-out.

f) A broadcasting schedule can be provided for any set of requirements. However, in order to fit all requirements into the available channels, it may be necessary to consider lower protection ratios after consultation with administrations.

g) Different frequency channels are assigned whenever possible to a given service area to minimize the co-channel and adjacent channel interference among all users in each broadcasting band and therefore this leads to the efficient use of the available broadcasting spectrum. In addition, the possibility of sharing the bands is enhanced since the potential for interference is minimized.

h) The flexibility exists to incorporate efficiently new requirements being submitted or modifications being made to existing requirements so that revised schedules may be available quickly.

i) The planning process is based on the use of one frequency assignment in a broadcasting band under normal conditions for each requirement.

j) The number of bands required to satisfy a broadcast requirement is based on the predicted reliability of the service.

k) Where the agreed technical criteria can be met, the same frequency will normally be assigned to a given requirement of an administration in successive seasonal schedules provided that optimum band sharing arrangements are not compromised.

The five essential elements to be utilized in the implementation of the planning system are the following:

1. Requirement Processing, the first element in the planning system, generates machine-readable input data from information provided on the forms submitted by administrations. These forms are standardized and the data are entered either by means of punched cards or directly through interaction with a computer terminal. All information submitted by administrations will be checked for completeness. The old and new requirements are merged to create an updated Master List of requirements with a commentary noting the changes implemented.

2. Propagation Analysis, the second element, generates or modifies a data base of normalized signal strengths for all relevant paths, including interference paths. Field strength predictions would always be based on the latest CCIR recommendations. Only calculations dictated by a change of season or of transmitter station are performed. If necessary due to time constraints, these variables can be pre-calculated on the basis of knowledge of requirements for previous seasons and therefore modifications will not require a large amount of additional computation.

3. Equipment and Band Selection chooses an appropriate antenna from a group of standard antennas and calculates the corresponding transmitter power to provide the required service. The reliability in the presence of noise is calculated for all frequency band combinations, for this selected antenna and power, and also for any equipment specified by administrations. Several methods to predict the service reliability are found in CCIR Report 892, based on the achievable signal-to-noise ratio in the available bands. The service reliability is used to choose the best band and equipment combination from those specified, or if no equipment is specified, the best bands for the selected antenna and power are chosen. Finally, a "Summary Information" document is provided which lists, for each requirement, up to five equipment/band combinations with the corresponding service reliabilities, and an estimate of band loading during the requirement period. Such information can be a valuable aid in the technical design of broadcasting facilities.

4. Compatibility Analysis considers all requirements for a given band and hour, and calculates the signal-to-interference ratios for all relevant paths. For each interfering signal, the minimum ratio found among all reception points in the service area of each requirement is retained for compatibility analysis. Requirements are considered to be compatible if they meet agreed criteria for co-channel and adjacent channel protection ratios. However, if these criteria have to be reduced below an acceptable level in order to satisfy all requirements, a schedule for the given band and hour will not be printed by Frequency Selection.

5. Frequency Selection attempts to produce a broadcasting schedule based on the results of Compatibility Analysis. For each requirement, all alternatives of compatible frequencies are analyzed, and that frequency is chosen which allows the greatest flexibility in assigning the remaining requirements. Provision is made for frequency continuity throughout each broadcast period, and assignments from the previous season are also taken into account. For those hour-band combinations where a schedule is not possible, key information is printed to permit administrations to reconsider their requirements or equipment configurations to resolve the incompatibilites.

In the implementation of the procedure, it is proposed that between sessions of the Conference, an Inter-sessional Working Group be established under ITU auspices to further develop the computer-aided planning system based on the essential elements and on the technical criteria agreed to at the first session. Moreover, it is proposed that the computer-aided planning system be utilized at the second session to process the broadcast requirements of administrations. After the Conference, it may be used by the IFRB for producing seasonal broadcasting schedules on a regular basis.

Agenda Item 4.2.4 A Program for Progressive Introduction of SSB Transmissions

The Conference will be tasked with the responsibility of establishing the beginning and duration of the transition period between DSB and SSB use of the HF broadcasting bands.

Proposal

It is suggested that a transition period in the order of 10 to 20 years would be appropriate. Moreover, it is envisioned that the initial phase of this transition period will consist of the gradual phasing out of DSB emissions, coinciding with the introduction of SSB transmissions.

During the entire transition period, SSB transmissions will also be received by conventional DSB receivers using envelope detection, and to avoid undue deterioration of reception quality, it will be necessary to operate SSB transmitters with a carrier reduction of only 6 dB. It is expected, however, that by the end of the transition period, SSB receivers will have achieved full market penetration.

Agenda Item 4.2.5 The action Necessary to Eliminate Harmful Interference

One of the most significant problems which has had an adverse effect on to the efficient utilization of the bands allocated to the HF Broadcasting Service is that of harmful interference, some of which is originated intentionally. Articles 18 through 22 of the Radio Regulations clearly outline the procedures to deal with harmful interference and it is essential that members exercise the utmost goodwill and mutual assistance to settle the problems of harmful interference.

Proposal

Administrations and broadcasters are encouraged, therefore, to adopt the following measures which would be most helpful in reducing and/or resolving harmful interference.

1. Use highly directional antennas wherever practicable;

2. Restrict the use of non-directional antennas to low-power transmissions for reception areas less than 2000 km from the transmitter locations;

3. Limit the effective radiated power to the minimum necessary to provide a satisfactory service;

4. Establish the minimum usable field strength for all reception zones;

5. Standardize modulation and emission characteristics;

6. Use synchronized transmitters where warranted;

7. Encourage manufacturers to produce receivers with improved technical characteristics;

8. Closely survey the HF broadcasting bands for out-of-band and unwanted emissions so that administrations can be advised of non-conformity with the Radio Regulations;

9. Cease intentional interference (jamming);

10. Encourage close co-operation between and among countries in the planning of the HF broadcasting bands;

11. Complete preparations well in advance of the changeover from the DSB to SSB mode of emission;

12. Place a limit of one frequency per band for the program requirement.

A resolution concerning intentional interference to the HF Broadcasting Service, based on one drafted by Region 2 members of the Inter-American Telecommunications Conference, is attached in Annex 1.

It is proposed that the Conference develop guidelines on the action necessary to eliminate harmful interference in the HF broadcasting bands based on the above.

Agenda Item 4.2.6 Theoretical Capacity of Any Given High Frequency Broadcasting Band

The capacity of any allocated frequency band can be defined in technical terms as the maximum number of assignments that can achieve an agreed level of service at a given time and for any specified service area. The capacity would depend on the combined effects of a number of technical criteria which include the following:

a) propagation conditions and their variation with sunspot cycle, season, and time of day;

b) technical and geographical characteristics including the position and distance of any transmitter with respect to its required service area, the gain, and directional characteristics for all interfering transmissions;

c) time considerations, i.e., the period of the day broadcasting takes place.

The extent to which the same frequency may be re-used at the same time without causing harmful interference can be determined by considering the combined effects of the above and other factors.

The number of emissions that can simultaneously serve the same service area will depend on the arrangement of all emissions in the frequency band considered and on the extent to which co-channel and adjacent-channel emissions serving other reception areas may cause interference in the service area considered.

Proposal

It is proposed that no single value for the capacity of any band be determined since the capability of a particular band to accommodate requirements over and above the number of 10 kHz channels that can be placed within the frequency limits of this band, is subject to factors which will vary from one schedule to another. The essential aspect is to maximize the utilization efficiency of the band during the planning process and the formulation of the seasonal schedules.

Agenda Item 4.3 Inter-sessional Activities

The first session of the HF Broadcasting Conference will establish the technical parameters to be used for planning and the principles governing the use of the HF bands allocated to the broadcasting service. It will also specify the form in which broadcast requirements for use in planning should be submitted, and the timetable for submission. The broadcasting requirements of as many administrations as possible should be submitted early to allow an inter-sessional working group to assemble and test the computer programs agreed to for the planning of the HF broadcasting bands. This inter-sessional working group will also provide recommendations on the maximum number of frequencies required for broadcasting to the same zone, and on the theoretical capacity of any given high frequency broadcasting band as well as on propagation and compatibility information. Thus an outline of a computer-aided planning system, which will incorporate all of the above information, should be available by August 1986 and the details forwarded to all administrations prior to the second session of the Conference.

Proposal

It is proposed that an inter-sessional working group be established consisting of ten or more administrations to begin the important task of assisting the IFRB to assemble and produce a working computer system by August 1986 so that results can be forwarded to administrations prior to the second session in October 1986.

Agenda Item 4.4 Form for Submission of Requirements to the Union and Preferred Time Limits

Proposal

A broadcast requirement is defined as a need to provide a broadcast service during a specified period to a specified reception area from a particular transmitter station. If the same program service originating from an administration for the same period and reception area is transmitted from more than one station then these are considered to be separate but associated requirements. A separate notice is required for each of these requirements with a change in the name and location of the transmitter station.

In general, a separate notice shall be sent to the IFRB for notifying each new broadcast requirement which is to acquire an operational designation for a particular season, for any change in the characteristics of a broadcast requirement for the season or in mid-season, and/or for any deletion of a broadcast requirement in the Master List or of a frequency assignment in the High Frequency Broadcasting Schedule for the season.

The proposed "Form of Notice for the Submission of HF Broadcast Requirements", specified in Part II of these proposals (i.e., Section A of Appendix 2), covers the minimum mandatory information and additional optional data that are required. The planning concept based on broadcast requirements makes full use of vital information provided and therefore it is essential that accurate details are submitted at the outset. In a resolution contained in Annex 2 of these proposals, it is suggested that administrations take note of a number of important factors related to the submission of broadcast requirements.

The time schedule and functions of the Inter-sessional Working Group are contained in Annexes 3 and 4 so that the necessary preparations can be completed after the first session of the Conference establishes principles and a method of planning. The Inter-sessional Working Group will engage in its tasks in consultation with the IFRB and CCIR to ensure that the second session has the necessary computer programming and broadcast requirement information to enable administrations to proceed with the actual planning exercise.

Agenda Item 4.5 Agenda for the Second Session of the HF Broadcasting Conference

It is proposed that the following Draft Resolution be submitted to the first session of the Conference for approval and for submission to the Administrative Council.

DRAFT RESOLUTION

Second Session of the WARC for the Planning of the HF Bands allocated to the Broadcasting Service for approximately seven weeks beginning early January 1986.

The Administrative Council,

resolves

1. that the second session of the Conference shall be convened for a duration of seven weeks to

a) carry out the planning according to the principles and the method established at the first session;
b) review, and, where necessary, revise the relevant provisions of the Radio Regulations relating to broadcasting in the HF bands.

2. that the agenda of the second session be developed on the basis of these tasks outlined in 1a) and 1b). (Minor revisions to the report from the first session will be considered based on new information or reports prepared after the first session of the Conference).

ANNEX 1

DRAFT RESOLUTION

INTENTIONAL INTERFERENCE TO THE HF BROADCASTING SERVICE

The World Administrative Radio Conference for the Planning of HF Bands Allocated to the Broadcasting Service

considering

a) that Resolution 508 of the World Administrative Radio Conference, 1979, invited the Administrative Council to take the necessary steps to convene a World Administrative Radio Conference consisting of two sessions for the planning of the high frequency bands allocated to the broadcasting service;

b) that it is important to ensure that all countries are guaranteed free and equal rights to the use of these bands;

c) that No. 135 of Article 35 of the International Telecommunications Convention, Nairobi, 1982, on harmful interference states, inter alia, that all stations must be established and operated in such a manner as not to cause harmful interference to radio services or communications of other Members;

d) that Resolution 508 and Recommendations 500 and 503 of the World Administrative Radio Conference, Geneva, 1979, relate to actions to be taken by administrations to reduce the existing congestion in the broadcasting bands;

e) that the Region 2 Inter-American Telecommunications Conference in 1982 and 1983 requested the ITU Secretary-General to inform all administrations of the serious consequences to the HF Broadcasting Conference if intentional interference does not cease;

f) that the observed situation concerning intentional interference (jamming), has significantly increased since WARC 79;

g) that intentional interference (jamming) has a serious impact on HF broadcasting on the adjacent channels as well as on the jammed channel and this action renders large portions of the broadcast bands unusable;

h) that intentional interference (jamming) violates the long- established basic principles of the ITU with respect to providing interference-free operation of radio services;

i) that the success of the HF Broadcasting Conference (WARC 84) will be seriously impaired unless intentional interference (jamming) ceases;

requests

the Secretary General of the ITU to draw the attention of all Administrations to this Resolution before the second session of the Conference.

ANNEX 2

DRAFT RESOLUTION

BROADCAST REQUIREMENTS

World Administrative Radio Conference for the
Planning of the HF Bands Allocated to the
Broadcasting Service, Geneva, 1984

considering

a) that this session of the Conference is to establish for use by the second session the form in which requirements for use in planning should be submitted to the ITU and the timetable for submission;

b) that the success of this planning Conference will be dependent upon administrations setting forth their minimum requirements to the Conference in order to avoid spectrum congestion, on the adoption of technical standards sufficient to support a satisfactory service, and on the adoption of planning methods capable of maximizing the efficient use of the spectrum;

c) that a standard and simplified requirements form is very important towards obtaining the necessary program information to enable planning of the HF bands;

d) that the technical parameters and the planning principles agreed to at the first session will require a significant amount of computer programming to develop a suitable working model;

requests the IFRB

1. to give special attention to the form in which broadcasting requirements are to be submitted by administrations;

2. to inform administrations of the format and the timetable for the submission of broadcast requirements;

3. to prepare suitable facilities to process broadcasting requirements.

ANNEX 3

DRAFT RESOLUTION

INTER-SESSIONAL WORKING GROUP (IWG)

World Administrative Radio Conference for the
Planning of the HF Bands Allocated to the
Broadcasting Service, Geneva, 1984

considering

a) that the availability of appropriate computer programs is essential to carry out adequately the planning of the HF broadcasting bands;

b) that some administrations have already begun to consider and develop such computer programs in connection with their national preparations and that these programs can assist other administrations and the IFRB in their respective preparations;

c) that specific guidelines for the preparatory tasks to be carried out before the commencement of the second session of the Conference, including assistance to the work of the second session by the establishment of an Inter-sessional Working Group (IWG), and the establishment of a timetable for the completion of these tasks are essential to the success of the Conference;

invites administrations

1. to co-operate and provide the Inter-sessional Working Group with computer programs;

2. to provide specialists in broadcasting and computer programming fields;

requests IFRB

1. to take the necessary steps for the convening of the Inter-sessional Working Group meetings;

2. to complete their engineering and other preparatory studies in good time prior to the second session.

ANNEX 4

INTER-SESSIONAL WORKING GROUP (IWG)

The terms of reference for this IWG are as follows:

1) to design a computer system according to the method approved at the first session of the HF Broadcasting Conference;

2) to assemble all related computer programs on HF broadcast planning into an operational system on the IFRB computers, according to the system design;

3) to use the technical parameters agreed to at the first session of the hF Broadcasting Conference;

4) to co-operate with the CCIR and the IFRB in this important inter-sessional activity;

5) to prepare a report for the information and comment of all administrations.

The proposed timetable will be as follows:

a) The Inter-sessional Working Group to meet in Geneva commencing in mid 1984 for a period of [five weeks];

b) The Inter-sessional Working Group to reconvene in early 1985 for a period of [three weeks] for the purpose of examining the results of the IFRB computer programming activities and to take into account the latest submission of broadcast requirements.

c) The IFRB to continue its computer programming activities until early 1986 for the purpose of producing a full report which shall be distributed to all administrations by August 1986;

d) All administrations to review the report and to offer comments as necessary prior to the second session;

e) The IWG to make itself available during the Second Session of the conference for the purpose of providing continuing advice and assistance as required.

ANNEX 5

PROPOSAL

Modifications to the map of 'geographical zones for high frequency broadcasting', on page AP1-33 of Appendix 1 (Radio Regulations, 1982), should be made to include zone area and reception points.

Discrete reception points chosen in an area of a zone

The letters in the column "Area" below signify:

C - Centre
N - North
S - South
E - East
W - West

ZONE	Area	Coordinates		Reception Point Number
001	C	158W	64N	1
001	N	157W	72N	2
001	S	153W	57N	3
001	E	144W	67N	4
001	W	166W	65N	5
002	C	126W	65N	6
002	N	125W	69N	7
002	S	125W	56N	8
002	E	112W	60N	9
002	W	128W	60N	10
003	C	100W	61N	11
003	N	102W	66N	12
003	S	102W	55N	13
003	E	96W	56N	14
003	W	106W	59N	15
004	C	78W	57N	16
004	N	78W	73N	17
004	S	79W	53N	18
004	E	75W	64N	19
004	W	87W	67N	20
005	C	50W	63N	21
005	N	52W	73N	22
005	S	46W	61N	23
005	E	23W	69N	24
005	W	69W	77N	25
006	C	122W	38N	26
006	N	123W	42N	27
006	S	120W	34N	28
006	E	112W	41N	29
007	C	100W	40N	30
007	N	100W	46N	31
007	S	101W	31N	32
007	E	94W	40N	33
007	W	105W	41N	34

ZONE	Area	Coordinates		Reception Point Number
008	C1	82W	39N	35
008	N	78W	43N	36
008	C2	87W	30N	37
008	E	74W	41N	38
008	W	84W	36N	39
009	C	59W	51N	40
009	N	63W	57N	41
009	S	63W	44N	42
009	E	53W	52N	43
009	W	65W	50N	44
010	C	99W	20N	45
010	N	106W	29N	46
010	S	100W	17N	47
010	E	90W	21N	48
010	W	116W	30N	49
011	C	72W	19N	50
011	N	65W	32N	51
011	S1	84W	10N	52
011	E	61W	15N	53
011	W1	88W	15N	54
011	S2	80W	09N	55
011	W2	86W	12N	56
012	C	70W	04S	57
012	N1	67W	07N	58
012	S1	76W	14S	59
012	E	65W	05S	60
012	W	80W	02S	61
012	N2	58W	07N	62
012	S2	69W	15S	63
013	C	48W	11S	64
013	N	48W	02S	65
013	S	48W	16S	66
013	E	35W	08S	67
013	W	55W	03S	68

ZONE	Area	Coordinates		Reception Point Number
014	C	64W	28S	69
014	N	65W	21S	70
014	E1	60W	24S	71
014	W	70W	33S	72
014	E2	58W	33S	73
015	C	49W	26S	74
015	N	44W	20S	75
015	S	51W	30S	76
015	E	40W	20S	77
015	W	55W	20S	78
016	C	69W	45S	79
016	N	69W	42S	80
016	S	68W	55S	81
016	E	63W	49S	82
016	W	74W	83S	83
017	W	22W	64N	84
017	E	15W	65N	85
018	S	18E	59N	86
018	N	19E	70N	87
018	W1	11E	60N	88
018	E	25E	60N	89
018	W2	05E	60N	90
019	C	41E	67N	91
019	N	33E	69N	92
019	S	34E	62N	93
019	E	47E	61N	94
020	C	60E	68N	95
020	N	59E	74N	96
020	S	66E	63N	97
020	E	70E	67N	98
020	W	53E	64N	99
021	C	79E	67N	100
021	N	80E	73N	101
021	S	80E	61N	102
021	E	86E	67N	103
022	C	102E	68N	104
022	N	92E	80N	105
022	S	102E	62N	106
023	S	120E	63N	107
023	E	125E	70N	108
023	W	113E	70N	109
024	S	143E	63N	110
024	E	151E	66N	111
024	W	140E	67N	112
025	W	159E	66N	113
025	N	162E	69N	114
025	E	165E	62N	115
026	N	180E	69N	116
026	S	176E	62N	117
026	W	173E	67N	118

ZONE	Area	Coordinates		Reception Point Number
027	C	00E	52N	119
027	N	04W	56N	120
027	S1	06E	43N	121
027	S2	02E	47N	122
028	C	20E	50N	123
028	S1	24E	40N	124
028	E	20E	45N	125
028	W	10E	46N	126
028	N	10E	53N	127
028	S2	13E	42N	128
029	N	40E	57N	129
029	S	40E	47N	130
029	E	46E	52N	131
029	W	30E	56N	132
030	C	59E	51N	133
030	N	57E	57N	134
030	S	60E	43N	135
030	E	69E	55N	136
030	W	56E	52N	137
031	N	82E	57N	138
031	S	80E	47N	139
031	E	88E	55N	140
031	W	78E	51N	141
032	C	104E	52N	142
032	S	107E	48N	143
032	N	106E	54N	144
032	W	95E	55N	145
033	C	118E	52N	146
033	N	126E	58N	147
033	S	123E	47N	148
033	E	130E	53N	149
033	W	113E	52N	150
034	C	141C	53N	151
034	N	138E	57N	152
034	S	142E	48N	153
035	S	157E	50N	154
035	E	162E	56N	155
035	W	156E	56N	156
036	C	28W	38N	157
036	E	16W	28N	158
037	C	02W	32N	159
037	N	03W	40N	160
037	S	02E	27N	161
037	E	07E	37N	162
037	W	08W	32N	163
038	C	18E	28N	164
038	N1	20E	32N	165
038	S	20E	25N	166
038	E	30E	28N	167
038	W	12E	33N	168

ZONE	Area	Coordinates		Reception Point Number
039	C	46E	25N	169
039	N1	43E	37N	170
039	S1	45E	20N	171
039	E	58E	21N	172
039	W	33E	35N	173
039	N2	33E	39N	174
040	C	58E	34N	175
040	N	52E	36N	176
040	S	57E	30N	177
040	E	67E	34N	178
040	W	52E	33N	179
041	C	80E	24N	180
041	N	77E	28N	181
041	S1	78E	13N	182
041	E1	85E	23N	183
041	W1	72E	23N	184
041	S2	80E	07N	185
041	E2	91E	23N	186
041	W2	70E	30N	187
042	C	82E	38N	188
042	N	87E	43N	189
042	S	85E	32N	190
042	E	86E	38N	191
042	W	82E	37N	192
043	C	102E	37N	193
043	N	97E	40N	194
043	S	104E	24N	195
043	E	107E	33N	196
043	W	92E	30N	197
044	C	118E	32N	198
044	N	123E	43N	199
044	S	114E	25N	200
044	E	128E	38N	201
044	W	113E	38N	202
045	C	140E	36N	203
045	N	142E	43N	204
045	S	130E	28N	205
045	W	130E	33N	206
046	C	03W	17N	207
046	N	12W	21N	208
046	S1	08E	04N	209
046	E	08E	15N	210
046	W1	18W	15N	211
046	S2	07W	05N	212
046	W2	13W	10N	213
046	S3	02E	08N	214
046	W3	24W	15N	215

ZONE	Area	Coordinates		Reception Point Number
047	C	21E	13N	216
047	N1	18E	18N	217
047	S1	23E	04N	218
047	E	26E	13N	219
047	S3	19E	08N	220
047	N2	15E	15N	221
047	S2	11E	04N	222
048	C	39E	04N	223
048	N1	39E	15N	224
048	S1	39E	00N	225
048	E	45E	02N	226
048	W	35E	08N	227
048	N2	32E	16N	228
048	S2	33E	02N	229
049	C	103E	18N	230
049	N	96E	22N	231
049	S	107E	11N	232
049	E	109E	14N	233
049	W	96E	17N	234
050	N	121E	15N	235
050	S	126E	07N	236
050	E	126E	13N	237
050	W	120E	11N	238
051	N	139E	02S	239
051	S	140E	08S	240
051	E1	151E	11S	241
051	E2	160E	09S	242
052	C	21E	05S	243
052	N	21E	02N	244
052	S	20E	16S	245
052	E	24E	06S	246
052	W1	13E	09S	247
052	W2	13E	01S	248
053	C	35E	15S	249
053	N1	39E	06S	250
053	S	44E	23S	251
053	E	50E	15S	252
053	W1	28E	15S	253
053	N3	35E	05S	254
053	N2	30E	03S	255
053	W2	30E	18S	256
054	C1	107E	06S	257
054	N	115E	05N	258
054	S	120E	10S	259
054	E	125E	02N	260
054	W1	95E	06N	261
054	C2	104E	01N	262
054	W2	102E	04N	263

ZONE	Area	Coordinates	Reception Point Number
055	C	142E 20S	264
055	N	131E 12S	265
055	E	153E 27S	266
055	W	134E 24S	267
056	C	168E 17S	268
056	W	156E 16S	269
056	S	168E 25S	270
056	E	178E 18S	271
057	C	28E 26S	272
057	N	20E 22S	273
057	S	19E 34S	274
057	E	31E 30S	275
057	W	14E 23S	276
058	C	125E 25S	277
058	N	128E 15S	278
058	S	118E 35S	279
058	W	114E 25S	280
059	C	145E 35S	281
059	N	145E 28S	282
059	W	135E 30S	283
059	S	146E 42S	284
060	N	174E 37S	285
060	S	167E 47S	286
061	C	155W 20N	287
062	C	171W 14S	288
062	N	175W 06S	289
063	C	138W 17S	290
063	N	142W 08S	291
064	C	140E 10N	292
064	N	145E 21N	293
064	W	135E 07N	294

ZONE	Area	Coordinates	Reception Point Number
065	C	168E 09N	295
065	N	165E 12N	296
065	S	177E 08S	297
065	W	157E 08N	298
066	C	07W 17S	299
066	N	14W 08S	300
066	S	10W 40S	301
067	C	10E 70S	302
068	C	69E 49S	303
068	N	78E 39S	304
068	W	52E 47S	305
069	C	78E 70S	306
070	C	132E 67S	307
071	C	170E 73S	308
072	C	98W 73S	309
073	C	60W 72S	310
074	C	00E 90S	311
075	C	00E 90N	312

PART II

AMENDMENTS TO THE RADIO REGULATIONS

Canada's proposed amendments to the Radio Regulations (1982 edition) include changes to Article 17 (Procedure for the Bands Allocated Exclusively to the Broadcasting Service Between 5950 kHz and 26100 kHz) and to Appendix 2. Although the Second Session of the HF Broadcasting WARC will deal with revisions to the relevant provisions of the Radio Regulations, the proposed regulatory changes are included for information purposes and to illustrate the means by which the proposed planning method may be implemented.

EDITORIAL PRESENTATION

Where the guidelines for the presentation of amendments to the texts of the ITU Radio Regulations have been utilized, the symbols used are as follows:

ADD - Proposal to add a new text.

SUP - Proposal to delete an existing text.

MOD - Proposal to amend an existing text by addition, deletion or replacement of words or figures.
Note: New words are underlined (underlined); words to be deleted are cancelled out (~~cancelled out~~).

(MOD) - Proposal to amend an existing text from an editorial point of view.

NOC - Text for which no change is proposed.

ARTICLE 17

Procedure for the Bands Allocated Exclusively
to the Broadcasting Service Between 5950 kHz and 26100 kHz

MOD Section I. Submission of ~~Seasonal High Frequency broadcasting Schedules~~ Broadcast Requirements to the International Frequency Registration Board

MOD 1748 §1. Periodically, administrations shall submit to the International Frequency Registration Board ~~the projected seasonal schedules of their broadcasting stations in~~ new or revised operational broadcast requirements, the composite of which appear in a Master List. These requirements are relative to the bands allocated exclusively to the broadcasting service between 5950 kHz and 26100 kHz. ~~These~~ Schedules based on this List shall cover each of the following seasonal propagation periods and shall be implemented at 0100 UTC on the first Sunday of the period concerned:

March Schedule	- March and April
May Schedule	- May, June, July and August
September Schedule	- September and October
November Schedule	- November, December, January and February

Reason: In order to reflect the fact that administrations will be requested to submit broadcast requirements in lieu of frequency requirements to the Board, amendments to the existing administrative procedures are necessary.

SUP 1749 §2.

Reason: The amendment procedure prescribed for use by administrations is outlined in Section III of this Article.

SUP 1750 ~~§3.~~

Reason: Since administrations will not submit schedules containing projected frequency usage, this paragrapn becomes redundant.

MOD 1751 ~~§4.~~ 2. The frequencies assigned by the Board are those which shall ~~shown in the schedules shall be frequencies that actually will~~ be used for that particular seasonal period and their number should be the minimum necessary to provide satisfactory reception of the particular programme in each of the areas for which it is intended. The Board shall prepare the frequency assignment ~~each administration should prepare its~~ schedule from season to season by using to the maximum extent practicable the same frequencies in each band as were used in previous schedules.

Reason: In order to clearly specify the procedure by which frequencies are assigned based on the notification of broadcast requirements and to specify the responsibilities of the Board, amendments to the existing procedures are required.

MOD 1752 ~~§5.~~ 3. The ~~schedules~~ broadcast requirements designated as operational shall be submitted in the form prescribed in Appendix 2, which specifies the data to be furnished for each ~~assignment~~ requirement.

Reason: Refer to reason given under No. 1751.

SUP 1753 ~~§6.~~

Reason: Refer to reason given under No. 1748.

ADD 1753A §4. To the extent practicable, those administrations not having suitable listings in the Master International Frequency Register may propose, on the basis of their operational broadcast requirements, any frequency band considered appropriate.

Reason: An administration shall retain the option of notifying a preferred frequency band in order to implement a broadcasting requirement. Discrete frequencies may be notified, but only insofar as they conform to the provisions specified in No. 1764A.

NOC Section II. Preliminary Examination and Preparation of the Tentative High Frequency Broadcasting Schedule

MOD 1754 ~~§7.~~ 5. (1) On receipt of the lists of operational broadcast requirements, ~~seasonal schedules~~, including confirmation in appropriate cases of the continuing validity of assignments

included in preceding schedules, the Board shall, on the basis of these requirements, incorporate the proposed frequency usage of all administrations into a combined schedule and make the appropriate preliminary examination required to prepare the "Tentative High Frequency Broadcasting Schedule" (hereafter called the Tentative Schedule) for the particular seasonal period. This Tentative Schedule shall include:

SUP 1755 a)

SUP 1756 b)

MOD 1757 ~~c)~~ a) frequencies ~~suggested~~ recommended by the Board ~~in respect of all services for which no specific frequency was included in the submitted schedule, such suggestions to be~~ made with due overall consideration for No. 1759, for compatibility within the Tentative Schedule, and for possible changes to the ~~projected frequency usage~~ Master List which might be desirable to achieve more equitable satisfaction of administrations' requirements.

SUP 1758 d)

Reason: There is no need to include much of the information specified in paragraphs a) to d) in the Tentative Schedule since administrations are requested to submit broadcast requirements in lieu of discrete frequencies.

NOC 1759 (2)

(MOD)1760 (3) The Board shall begin the work outlined in Nos. 1754 ~~to 1758~~ and 1757 early enough for the Tentative Schedule to be issued to administrations not later than two months before the date when the particular seasonal period begins.

MOD Section III. ~~Technical Examination and~~ Revision/Modification of the Tentative Schedule

SUP 1761 §8. (1)

Reason: It is envisioned that the application of a computer-assisted frequency selection technique will make it possible to deal with an incompatibility problem before it arises. If, however, the number of seasonally or mid-seasonally adjusted broadcast requirements submitted by administrations is such that incompatibilities appear likely, the provisions outlined in paragraph 1764C shall apply.

MOD 1762

§6. ~~(2)~~ (1) In preparing its recommendations to administrations the Board shall take into account monitoring observations and all other available data. However, when actual frequency usage is apparently not in conformity with the assignments in a ~~submitted~~ particular seasonal schedule, the Board shall seek from the administration concerned confirmation of this information. On receipt of the relevant information the Board may suggest an appropriate course of action such as a modification of the date of implementation of a particular operational requirement.

Reason: This provision is designed to deal with those circumstances in which frequency assignments are contained in the seasonal schedules but are not put into operation.

SUP 1763

(3)

ADD 1763A

(2) When an administration intends to make modifications or amendments to the Master List, i.e. either:

- to modify the characteristic of any of its broadcast requirements in the HF broadcasting service which are shown in the Master List, or for which the procedure in this Article has been successfully applied, whether or not the station has been brought into use; or

- to include in the Master List, a new broadcast requirement in the HF broadcasting service; or

- to cancel a broadcast requirement or frequency assignment in the HF broadcasting service;

the following procedures as specified in paragraphs 1764A to 1764D shall be applied.

Reason: A more complete description of the circumstances under which modifications to the Master List are to be permitted and the procedures which are to be utilized in effecting changes to the characteristics of broadcast requirements are the basis for inclusion of the new paragraphs 1763A to 1764D.

SUP 1764

(4)

Reason: The additional provisions contained in this Section render this clause redundant.

ADD 1764A

(3) Administrations intending to modify characteristics of requirements forming part of the Master List shall send to the Board no earlier than one year and no later than five months before the date on which the broadcast requirement becomes operational, the relevant information listed in Appendix 2. Modifications received after that date may be accommodated, provided that optimum band sharing arrangements are not compromised.

Reason: Refer to reason given under No. 1763A.

ADD 1764B

(4) Upon successful completion of the modification to the Master List as a result of the application of the appropriate provisions of Section III of this Article, the Board shall make the necessary changes to those assignments in the Master International Frequency Register with the dates referred to in No. 1764A.

Reason: Refer to reason given under No. 1763A.

ADD 1764C

(5) If the application of the modification procedure and the associated technical examinations cannot accommodate additional requirements without giving rise to interference, an administration shall be asked to coordinate its proposed usage with those administrations which could be affected. In consultation with the administrations in question the Board shall make such recommendations as it may be able to offer.

Reason: Refer to reason given under No. 1763A.

ADD 1764D

(6) In instances where the presence of harmful interference adversely affects the reception of a programming service, provision shall be made for an administration, in consultation with the Board and other affected administrations, to pursue an appropriate course of action which could include the possibility of changing frequency provided that optimum band sharing arrangements are retained.

Reason: This provision may enable administrations to maintain the integrity of a broadcast requirement despite the presence of harmful interference.

MOD 1765

~~(5)~~ (7) For changes notified in accordance with Nos. ~~1763~~ 1763A ~~and~~ ~~1764~~ to 1764C, the Board shall apply the same procedure as that specified in Nos. 1759, 1761, and 1762. Such revisions to the Tentative Schedule as result from the application of the procedure in this Section shall be published in the IFRB weekly circulars in order that administrations can keep up to date their copies of the Tentative Schedule.

NOC

Section IV. Publication of the
High Frequency Broadcasting Schedule

(MOD) 1766

~~§9.~~ 7. After the end of each seasonal period, the Board shall publish the High Frequency Broadcasting Schedule, which shall reflect the Tentative Schedule as amended by all the changes notified to the Board since the publication of the Tentative Schedule. This High Frequency Broadcasting Schedule shall indicate by appropriate symbols:

NOC 1767

NOC 1768

SUP

Section V. Annual High Frequency Broadcasting
Frequency List

SUP 1769

§10.

Reason: In light of the provisions contained in Section IV, it would appear that the publication of such a list would not be cost effective from an administrative point of view, since it would contain redundant information.

(MOD)

Section ~~VI.~~ V. Miscellaneous Provisions

(MOD)1770

~~§11.~~ 8. The technical standards used by the Board when applying the provisions of this Article should be based not only on the factors listed in No. 1454 but also on past experience in broadcasting planning and on the experience gained by the Board in the application of the provisions of this Article.

SUP 1771

§12.

Reason: With the application of an agreed planning system, there would be no requirement for the Board to carry out long-term engineering studies for the purpose of developing compatible technical plans.

SUP 1772

§13.

Reason: In view of the provisions specified in No. 1764D, this paragraph is rendered redundant.

ADD 1772A

§9. The Board shall assign frequencies on the basis of the operational requirements identified in the Master List of projected and current broadcast or programming requirements of administrations. In embodying the principles of equitable access to the high frequency bands allocated to the broadcasting service the Board shall endeavour to the extent possible to assist administrations in coordinating

frequency usage and in helping to resolve conflicts if they arise. If necessary the Board shall recommend an appropriate course of action in cases where such conflicts cannot be resolved through bilateral or multilateral coordination.

Reason: The Board's role in implementing an agreed planning system and in assisting administrations in the coordination process should be clearly indicated.

NOC 1773
to
1797

APPENDIX 2
(see Article 17)
SECTION A

BC
Class of Station

FORM OF NOTICE FOR THE SUBMISSION OF BROADCAST REQUIREMENTS

PAGE: of	DATE:	(for IFRB use only)

A NOTIFYING ADMINISTRATION	B REQUIREMENT NUMBER	C NOTIFICATION INTENDED FOR	D REQUIREMENT START DATE	E REQUIREMENT STOP DATE	F CALL SIGN OR IDENTIFICATION
	⌊_____⌋	☐ ADD ☐ MOD ☐ SUP			

BASIC REQUIREMENT DATA (MANDATORY)

1 NAME OF TRANSMITTING STATION	2 LONGITUDE Deg Min E/W	LATITUDE Deg Min N/S	3 INTENDED RECEPTION ZONES	4 HOURS OF OPERATION U.T.C.	5 DAYS OF OPERATION ALL	M	T	W	T	F	S	S

OTHER PERTINENT TECHNICAL AND PROGRAM DATA (OPTIONAL)

6 FREQUENCY BAND (s) IN MHz	7 DESIGNATION OF EMISSION	8 Tx POWER kW or dBW	9 ANTENNA TYPE	10 ANTENNA GAIN (dBi)	11 HORIZONTAL BEAMWIDTH (degrees)	12 VERTICAL BEAMWIDTH (degrees)	13 AZIMUTH MAXIMUM RADIATION (degrees)	14 ELEVATION MAXIMUM RADIATION (degrees)	15 ANTENNA FREQUENCY RANGE MIN MHz	MAX MHz	16 SUPPLEMENTARY INFORMATION

Section B - General Instructions

MOD 1. A separate notice shall be sent to the IFRB for notifying:

- each ~~frequency assignment to be put into use~~ new broadcast requirement in the Master List which is to acquire an operational designation for a particular season;

- any change in the characteristics of a broadcast requirement ~~frequency assignment~~ in the Master List of current operational and projected requirements, ~~High Frequency Broadcasting Schedule~~, for the season or in mid-season;

- any deletion of a broadcast requirement in the Master List or frequency assignment in the High Frequency Broadcasting Schedule, for the season.

Reason: Administrations are requested to submit to the IFRB their broadcast as opposed to frequency requirements. The selection and assignment of discrete frequencies are to be made by the Board on the basis of the computer-aided planning system outlined in the Canadian proposals.

SUP 2.

Reason: In view of the changes proposed in the Form of Notice, the instructions contained in this paragraph are no longer applicable.

ADD 2. Administrations should note that each broadcast requirement must include, aside from the basic administrative information, the name of the transmitting station, its longitude and latitude, the intended reception zone(s), the hours of operation (UTC) and the days of operation. The submission of other pertinent technical data shall be at the discretion of the notifying administration.

Reason: This instruction is consistent with the information requirements of the proposed Form of Notice.

1. General Notes

(MOD) ~~(a)~~ (A) The name of the notifying administration should be indicated.

SUP (b)

ADD (B) The requirement number should be indicated.

Reason: To be consistent with the proposed Form of Notice.

MOD ~~(c)~~ (C) Indicate in this the appropriate boxes by the letter "X" when the notice reflects a change in the characteristics of a broadcast requirement or of a frequency assignment in the Tentative High Frequency Broadcasting Schedule, for the season.

MOD ~~(2)~~ (1) In the case where the change is an addition to existing particulars as indicated by the letter "X" in the box labelled "ADD", the additional characteristics should be shown in the appropriate place and should be underlined.

MOD ~~(1)~~ (2) In the case where existing particulars are changed as indicated by the letter "X" in the box labelled "MOD", the new characteristics in the appropriate place should be underlined; the original characteristics which have been changed should be shown in brackets underneath or at the side.

(3) In the case where the change is a cancellation of a particular characteristic or characteristics as indicated by the letter "X" in the box labelled "SUP", this should be shown in the appropriate place by a dash and, underneath or at the side, the characteristics which have been cancelled should be shown in brackets.

SUP (d)

SUP (e)

Reason: To be consistent with the proposed Form of Notice.

ADD (D) The requirement start date should be indicated here.

~~Column 2e~~
MOD 1. If the broadcast requirement ~~assignment~~ is to be brought into use on the date of the seasonal schedule, indicate the last two digits of the year ~~in the box(es) of~~ and the season(s) for which the broadcast requirement ~~assignment~~ is to be used.

MOD 2. If the broadcast requirement ~~assignment~~ is to be brought into use or changed by any date other than the implementation date of the particular seasonal schedule, this date shall be entered in the space provided.

Reason: The information contained in this section was formerly contained in Column 2c of the Form of Notice.

ADD (E) The requirement stop date should be indicated here.

Reason: To be consistent with the prposed Form of Notice.

(MOD) (F) Indicate the call sign or other station identification used in accordance with Article 25.

Reason: Text has been transferred from Column 3 of Section II.

NOC II. Notes Concerning Information to be Entered in the Specific Columns of the Notice

(MOD) ~~Column 4~~ Column 1 Name and location of transmitting station.

(MOD) ~~4a~~ 1a Indicate the name of the locality by which the transmitting station is known or in which it is situated.

(MOD) ~~4b~~ 1b Indicate the country in which the station is located. Symbols from the Preface to the International Frequency List should be used.

(MOD) ~~Column 4c~~ Column 2 Indicate the geographical coordinates (in degrees and minutes) of the transmitter site.

(MOD) ~~Column 5a~~ Column 3 Zone(s) or area(s) of reception

1. Indicate in this column the zone(s) of reception as shown in the map annexed to Appendix 1.

2. If the reception area is smaller than an entire zone, it should be indicated as a country or part of a country using symbols from the Preface to the International Frequency List, as far as possible.

3. Indicate, as supplementary information, the maximum service range (in km) when this is considered necessary.

(MOD) ~~Column 10~~ Column 4 Hours of operation (UTC).

ADD Column 5 Days of operation.

Reason: An indication of how often each broadcast requirement is implemented could be used to rationalize spectrum utilization.

ADD — The submission of information relative to Columns 6 through 16 is at the discretion of the notifying administration.

MOD — ~~Column 1~~ Column 6 Frequency band(s).

MOD

SUP — 1a

SUP — 1b

MOD — ~~1c~~ 6a Indicate the desired band proposed band(s) in MHz, ~~if a specific frequency is not given under 1a and 1b above~~.

Reason: Administrations are to submit broadcast requirements, not frequency requirements.

MOD — Column 7 ~~Class~~ Designation of emission ~~and necessary bandwidth~~.

Indicate the ~~class~~ designation of emission ~~and necessary bandwidth~~ in accordance with Article 4 and Appendix 6.

MOD — Column 8 Transmitter Power (in kW)

Indicate the carrier power supplied to the transmission line, in kW or dBW.

(MOD) — ~~Column 9c~~ Column 9 Type of antenna.

The nomenclature of the CCIR Book "Antenna Diagrams" should be used wherever it is applicable as shown in a list at the end of this instruction (see III of this Section).

MOD — ~~Column 9c~~ Column 10 Antenna gain (dB).

The relative gain of the antenna in the direction of maximum radiation for the broadcast requirement ~~assigned frequency~~ should be indicated, for the proposed bands.

Reason: Refer to reason given under No. 1 of Section B above.

MOD — ~~Column 9b~~ Column 11 ~~Angular width of radiation main lobe~~ Horizontal beamwidth.

The total angle in the horizontal plane, in degrees, within which the power radiated in any direction does not fall more than 6 dB below the power radiated in the direction of maximum radiation, should be indicated.

ADD — Column 12 Vertical beamwidth

The total angle in the vertical plane, in degrees, within which the power radiated in any direction does not fall more than 6 dB below the power radiated in the direction of maximum radiation, should be indicated.

(MOD) ~~Column 9e~~ — Column 13 Azimuth of maximum radiation.

1. If a directive transmitting antenna is used, indicate the azimuth of maximum radiation of the transmitting antenna in degrees (clockwise) from True North.

2. If a transmitting antenna with non-directional characteristics is used, insert "ND" in this column.

(MOD) ~~Column 9d~~ — Column 14 Angle of elevation.

The angle of the direction of maximum radiation in the vertical plane in degrees should be indicated.

SUP Column 12b

ADD — Column 15 Antenna frequency range.

The minimum and maximum range of each antenna should be given in MHz.

MOD — Column 16 Supplementary Information

Any other information supplied by the administration should be indicated in the space provided.

1. Indicate after the symbol COORD/the name of any administration with which coordination has been effected for the use of the frequency; if no coordination has been effected, the indication "Nil" should be inserted.

Reason: Refer to reason given under No. 1 of Section B above.

MOD

2. Any other information which the administration considers to be relevant should be indicated, such as, for example, the maximum service range when this is less than 2000 km; ~~or information concerning the use of the notified frequency if such use is restricted; or if the frequency is not used during all the hours indicated in Column 10, or on certain days of the week only~~; or if synchronizing techniques are used; or the minimum and maximum frequency range of the antenna in MHz.

Reason: The examples deleted above are either inconsistent with the approach whereby broadcast requirements are notified or are accommodated elsewhere; the additional example could supplement the data base information with regard to transmitting antenna characteristics.

NOC

III. Symbols for Type of Antenna